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4253 Kc.	7011.75 Kc.	7053.5 Kc.	7145 Kc.	10.511 Mc.
4495 Kc.	7012 Kc.	7063 Kc.	7150 Kc.	10.515 Mc.
5050 Kc.	7016 Kc.	7064 Kc.	7156 Kc.	10.524 Mc.
5300 Kc.	7018 Kc.	7068 Kc.	7162.5 Kc.	10.530 Mc.
5360 Kc.	7021 Kc.	7072 Kc.	7163 Kc.	10.5465 Mc.
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## EDITORIAL



### INTRUDERS IN THE AMATEUR BANDS

There is no need to ask the Amateur Service in Australia whether it has listened to the interference on the 20, 40 and 80 metre bands—and even the 15 metre band—during the period since the re-licensing of Amateurs after World War II! The commercial intruders into the portions of the frequency spectrum specially allocated to the Amateur Service on a world-wide basis by decisions reached at the International Telecommunications Conference held at Atlantic City in 1947 and subsequently ratified by all signatory Nations at a Conference in 1952, is enough to drive the DX Amateur and Short Wave Listener—and even the 40 and 80 metre rag-chewer—to the proverbial drink!

The Wireless Institute of Australia, along with other member societies of the International Amateur Radio Union, has consistently brought the matter to the notice of the country's Administration—in Australia, the Postmaster-General's Department, in the United Kingdom the British Post Office, in the United States of America the Federal Communications Commission and many other Authorities in various countries of the world whose official representative signed the agreement to the Frequency Table laid down at Atlantic City. What a futile effort it has turned out to be!

The Amateur Service has a mere slice of the relatively vast frequency spectrum available to short wave broadcast. Manual A1, Automatic A1 and other transmissions, yet the encroachment into the meagre Amateur bands has to be heard to be believed. Why is it that these Commercial vagrants can on the one hand sign an agreement to a Frequency Table based on world-wide requirements, and on the other hand violate the agreement insofar as the Amateur allocations are concerned? The Amateur Services of the world would like to know the answer to that question!

However, the Amateur Service can do something vital about it and it is high time they did. The Atlantic City Convention set up one clear channel for complaints of violation; the user of a Service being interfered with must register his protest with his own national administration, which in turn files a notice of violation of the treaty with International Telecom-

munications Union and with the administration having jurisdiction over the illegally-operating stations. There is no alternative procedure. While international organisations may be invited to take part in discussions of I.T.U. committees and study groups, they have no other official status with I.T.U. Only signatories to the treaty—Governments—can demand action of any kind.

The International Amateur Radio Union states emphatically that member societies should repeatedly protest the presence of intruders to their own telecommunications authorities. Reports should be as complete and correct as possible, and should demonstrate that the Amateur Service is being interfered with; the presence of a non-Amateur station in the band does not constitute violation of the treaty in itself.

The Amateur Service has as much right to preserve its domain as any other Service. If the Amateur strays from his allocated frequency bands he is dealt with by his Administration in no uncertain terms. Yet fifty confirmed foreign transmissions have encroached on the Amateur bands and simply nothing is done about it. The Australian Amateur is strongly recommended to forward in those complete reports and the W.I.A. will take stern steps this time to see that something is done about it.

Next month "Amateur Radio" will print the first official listings extracted from the documents of the International Frequency Registration Board at I.T.U. Headquarters in Geneva of known "foreign" transmissions in the Amateur bands. These are only for the period November, '54, through to July, '55. What a deplorable sight it is too!

Of course it must be remembered that some of the interfering stations—all of which have not been confirmed in this list—originate in countries who were not signatories to the Atlantic City Frequency Table. Little assistance can be hoped for from the Administrations of these countries, but if half of those in the list were removed our bands would be more habitable. It's up to each and every Amateur to do some real logging, screening out image reception, unconfirmed reports and reports of stations operating legally under the treaty. Go to it!

FEDERAL EXECUTIVE

# The "2YY" Transmitter

(VK2YY is the call sign of the Radio Section of the Leichhardt Petersham Technical College)

BY N. S. BEARD,\* VK2ALJ

AT the first full-scale meeting of the Television Interference Committee of the N.S.W. group of the W.I.A., under the chairmanship of Dr. R. Black, VK3QZ, it was determined that with the advent of t.v. it was necessary to design a suitable transmitter to replace the older type rack-and-panel or assorted bread-board types said to be still in use. It was therefore moved, and seconded, that the two technical officers of the group—VK2OT and VK2ALJ—be requested to design and produce a transmitter to the following specifications:—

- To operate on all licensed Amateur bands, 80-40-20-15-10 metres, the input to be the full licenced power of 100 watts at maximum loading.
- To be capable of either c.w. or modulated output.
- V.f.o. controlled, with calibrated dial on all bands, to conform to present-day Amateur practice.
- Entirely self-contained in the one "dust-cover," fully screened and shielded so that the harmonic output was negligible (especially above 30 Mc.), and therefore suitable for use in close proximity to any t.v. receiver and, if possible, near any standard broadcast receiver with zero interference.

After a short conference, the "2YY" transmitter was designed, laid out, and built to its original design, with one minor modification—that is, the addition of a heavy duty handle at each end, one for the op. and one for the XYL.

It was decided to develop the rig around the readily available "Geloso" v.f.o. unit, which seems to fill the bill nicely as a reliable compact driver, and to use either a single 6146 or two parallel 6146s in the p.a. stage. For harmonic suppression, the p.a. tuning is a pi-network, which avoids plug-in coils and can be band-switched.

Output is taken through a suitable aerial coupler, via a low pass filter when required, and loads into either an end-fed long wire or feeders at practically any impedance.

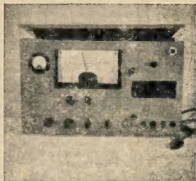
To avoid radiation of p.a. harmonics, or oscillator fundamental, the whole r.f. section, including the v.f.o. unit, is totally screened in a perforated metal enclosure, giving ample ventilation but a complete blockage of radiation except through the output co-axial cable. The v.f.o. cannot be heard in the receiver for "netting" unless a section of hook-up wire is pushed through a convenient hole in the screen and brought over to the receiver.

## V.F.O. UNIT

The Geloso unit consists of a band-switched Clapp oscillator using a 6J5, followed by a 6AU6 isolator and a 6V6 buffer-doubler—on 21 Mc. it is a tripler.

With 350 to 400 volts supply, the 6V6 develops up to 8 Ma. drive on the p.a. grid—provided it is lined up after installation.

The only modification found necessary was on the 7 Mc. band. It was reported from various sources that the original layout gave trouble, having the oscillator on 7 to 7.45 Mc., the 6AU6 as an aperiodic amplifier, and both 6V6 buffer and output stage also on 7 Mc. It was



decided to shift the L2 jumper on the oscillator selector switch to place the oscillator on L3 (3.5 to 3.6 Mc. as for 14 and 21 Mc. range), doubling in the 6V6 to 7 Mc.

This necessitates a recalibration of the 7 Mc. dial scale to match up with the 14 and 21 Mc. markings. Some hand cleaning compound on a well-

chewed match stick removed the original scale, which now reads 7.0 to 7.2 Mc., giving better bandspread on our most crowded band.

## POWER AMPLIFIER STAGE

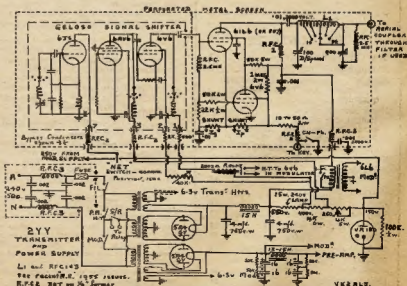
The grid circuit was wired to take parallel 6146s with 25,000 ohms of grid resistance. The 6146s loaded to at least 99.5 watts for c.w. work, but for phone work one 6146 was removed (after it cooled down!) and the remaining tube loads to about 85 watts input—a slight overload—but was backed off to about 75 watts after checking the price of the tube.

The stage works into a band-switched pi-network, similar to that described in December, 1955, "A.R." tuned with 90 pF. (max.) input and about 1050 pF. (max.) variable condensers. The input condenser needs to be double spaced to avoid arc-over, as the r.f. peak here on modulation is probably up near 2,000 peak volts.

The output condenser can be a three-gang b.c. receiver type (all sections in parallel), and does not arc over when aerial is connected and properly adjusted, but will do so without load.

For c.w. work, the oscillator and buffer run continuously and the screen of the p.a. is held down by a 6V6 clamper tube. The circuit used is from "Radiotronics," October, 1951—with a modification as the 6146 screen current is about 12 Ma. per tube, against about 8 Ma. with 507s.

The keying is clean and no back wave is audible with the key up.



\* 4 De Chair Road, Dee Why, N.S.W.





# MODEL "1XA" CRYSTAL MICROPHONE INSERT



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## TECHNICAL DETAILS

Rochelle salt crystal microphones are perhaps the most widely used for all types of service where quality speech and music reproduction at high output levels is a requirement. They are dependable in performance and when fitted with the appropriate "Zephyr" filter, their frequency response may be adjusted to suit any application or requirement.

This crystal microphone requires to be terminated with a high value parallel load of the order of 1 to 5 megohms for best results.

The mass of the moving parts is small, hence the sensitivity is high and a high efficiency is achieved.

Light gauge solder lugs are provided so that excessive heat in soldering will not be transmitted to the crystal element.

When mounted in a microphone cage, it is recommended that the insert be suspended in rubber, to eliminate shock and vibration.

One of the connecting lugs is directly connected to the case and care should be taken to solder the metal shield of the microphone cable to this solder lug, keeping the unscreened portion of the centre conductor as short as possible to eliminate hum pick-up.

All crystal elements are mounted on high grade suspension pillars, being fixed thereto with a good quality cement, thus ensuring stability and long life.

Case  $1\frac{1}{2}$ " diameter (rear),  $\frac{1}{8}$ " thickness, 1-13/16" overall diameter (front) with filter fitted.

Frequency Response = 60-6,500 c.p.s.  
Output Level = -45 db (0 db = 1 volt/dyne/cm<sup>2</sup>)  
Impedance = Model 1XA Grid 1 — 5 megohms.



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former is necessarily placed against the modulators in a position which allows short leads to the modulator plates, and to the h.t. input to the p.a. enclosure.

A depth of 4 inches allows the audio driver transformer, our modulation relay, and all filter condensers to be placed below the chassis, without crowding or obscuring connections, but no space is wasted.

The signal shifter and the p.a. compartments are formed of perforated mild steel, bent to make a "meat-safe" around the section, with a partition between exciter, and p.a. section. This allows through-ventilation, but seems a good r.f. shield. The lid over the r.f. section is also perforated metal, all fastened with self-tapping screws.

Under the chassis, a single r.f. shield covers the connection, buffer output condenser to p.a. grid, all the p.a. grid wiring, meter chunts, and clamper tube circuitry, with a single entry for the modulated h.t. from the modulation transformer. This lead enters through a feed-thru type condenser, and through an r.f. choke right against this condenser.

All heater wiring into this enclosure is in shielded cable, and is by-passed at the sockets.

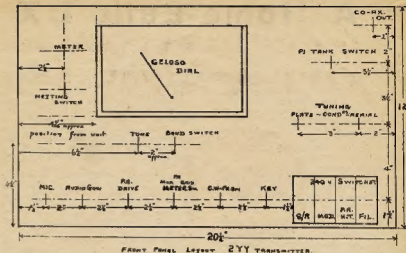
The meter selector switch is in this enclosure, but leads leaving the enclosure are passed through small r.f. chokes and by-pass condensers at the point of entry. The same precaution is taken on the key outlet, the "hot" lead is by-passed and has an r.f. choke in its short connecting lead. By-pass condensers should be of sufficient voltage rating to prevent breakdown with killing surge voltage.

The control switches are small 240v. a.c. architrave switches, fitted into a shielded enclosure with a mains filter fitted behind them. The conductors leaving this enclosure, taking 240v. a.c. to power transformer primaries, need not be by-passed or shielded since no r.f. is likely to give trouble here.

Since the outer cabinet is 12 inches high, the p.a. and exciter enclosure is made  $7\frac{1}{2}$  inches high to give as much space as possible for p.a. tube and the pi-filter components. If an 807 had been used, a Geloso tuning unit could have been used here, with the pi-filter coil and its switch as high as possible to allow room for the tuning condensers.

Audio wiring is normal, and forms a straight-through section at one end, working back from the microphone input, to the 6L6 modulators, but leaving room here for the bias transformer. The modulator filter condensers, using two 16  $\mu$ f. electrolytic condensers in series, each in parallel with 50,000 ohms, are tucked neatly under the rear lip of the chassis.

In the audio wiring the only precautions taken were to see that heater wiring was secured against the chassis, well away from grid and plate leads, and also that the input connection between mike socket and the 6SJ7 grid pin, which is, after all, only a half watt resistor plus its leads, is covered with spaghetti tube, and then pulled through a section of copper braid, earthed at each end. It is surprising how this precaution reduces hum in the modulator output.



# CONSTRUCTION SEQUENCE USED

1. Layout and fabricate the main chassis.

2. On this chassis, place the power transformers, p.a. choke and modulation transformer, signal shifter, bias transformer and the filament transformer.

Check the spacing and mark off their positions. Place the necessary sockets on the chassis near their final positions, spaced to allow room for the tubes, and mark these positions.

Cut out or punch the necessary holes. On the front of the chassis mark out and drill, or cut out, the openings for control switches and potentiometers.

3. Cut the front panel to size, 20 1/2" x 12" high. In our transmitter we bent a lip 1/4" wide top and bottom to give rigidity, and to form a point for securing the bottom cover and to rest the lid.

Brass is easy to work and can be polished or sprayed. Lay it in place against the chassis and mark out the clearance holes for potentiometers and

control switches. It may be secured to the main chassis using the potentiometer and switch shaft, but a separate panel behind it gives better shielding.

4. Mount all sockets and components except the two large transformers and the p.a. choke, and you may proceed with the wiring, etc. If the power transformers are bolted in place it becomes a two-man job to shift it.

5. The Geloso is mounted on a vertical panel bent to shape behind the main front panel, measuring about 16" x 7 1/2" high. This panel is a separate shield, but the main panel bolts to it so that all tuning condensers and most shafts bolt the two together.

6. Mount the pi-network coils and condensers, and then the power transformers are bolted on and wired up. It now weighs about 1 lb. per watt.

7. Finally, fabricate and fasten on the cabinet, lid and bottom cover, at which time the rig is nearing completion.

[Next month the testing and alignment procedures will be featured.—Ed.]

THE LONG-AWAITED

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# A Home-Built DX Receiver

BY H. F. RUCKERT,\* VK2AOU

IN "Amateur Radio" for April and May, 1954, there was a general discussion of DX receiver problems under the heading "Short Wave Receiver Selectivity Problems and the Double Crystal Filter as the Answer." The author described the different stages of a receiver and the characteristics of these stages as far as sensitivity and selectivity is concerned.

A further article, "A Discussion on Receiver Performance," "A.R." May, 1955, makes it clear why the different stages of the receiver front end have to be so carefully designed to give the expected performance.

The third article of this series may now demonstrate how the theoretical thoughts and planning have been used to design a modern DX receiver. Since the problems have been discussed in the two aforementioned articles in detail, a fairly brief description of the practical work may give enough information to the interested Amateur who still prefers to build his own receiver.

## LAYOUT AND MECHANICAL CONSTRUCTION

Three independent chassis are used for the r.f., i.f., and a.f. plus power supply part of the receiver. These chassis are in a shielded cabinet which has a frame of welded angle iron for stability. This method has several advantages. Each chassis does not become too bulky or heavy, and it is easy to get to any component for measurements, aligning work, or repairs. There is also a lot of front-panel space which allows the placing of components at the desirable points. Each chassis is held by only four screws in the frame. They are interconnected by a six-contact cable so that they can be operated outside the shielded cabinet—important during the developmental time or when repairs may be necessary.

The lowest chassis includes the cascade pre-amplifier, the two r.f. stages, the first mixer and first oscillator, a voltage regulator and the 1 Mc. crystal frequency marker. Looking from the side at the chassis, we see a cross-like section of chassis behind the front panel.

The shielded valves are mainly in the upper front section in the same sequence as the circuit is drawn. The other half of the top section is divided by shields in such a way that a shield is always between the pins of each valve holder so that grid-1 and plate circuits are separated. These small compartments contain only the resistors and most of the ceramic disc-type by-pass capacitors. The r.f.-free end of these small components and leads are soldered to resistor strips. From here a string of cables go down to the other part of the chassis. The solder lugs provide handy measuring points.

The lower front section of this chassis accommodates the two turrets, each of which has three sections for six bands. Each turret has six strips which hold

three coils, ceramic disc-type trimmers, ceramic disc or tubular padder or parallel capacitors of suitable temperature coefficient. It is very easy to take the tuning section strips out to change inductance or capacity. The coils have iron dust plugs with a slotted bakelite screw for screwdriver adjustments. The turret contacts are Berilium plated and have given trouble-free service for three years.

The turrets are installed in such a position that the coils and trimmers, which are switched to the circuit, can be reached through a slot in the bottom of the receiver cabinet to allow re-calibration without taking the receiver out of the cabinet. Behind the turrets are the two shielded four-gang air capacitors of 5 to 18 pF. capacity, in one of which only two sections are used. Stators and frame are machined out of two blocks of a light alloy. The rotors are machined too, but they are shrunk on a precision-ground low-loss steatite spindle held by ball bearings.

All the r.f. leads from the valves, the coils and variable capacitors meet at the centre of the chassis cross with very short leads. There are two dials, but the one for the preselector needs only tuning in certain cases. The bands are spread to cover 330° to 350° of the tuning dial. A fine steel cable does the transmission. The tuning knob makes 20 turns to cover the bands and on 14 Mc. about 3/8" on the dial represents 10 Kc.

In the middle is the i.f. chassis which also includes the "S" meter. Underneath this sub-chassis there is only space for small components and the wiring.

The upper chassis carries all the stages which dissipate a lot of heat, like the power supply and the a.f. amplifier, to keep the heat-sensitive tuned circuits cool. There is also a small loudspeaker.

It may be mentioned that all components, except some valves, are of German origin. All coils have been wound by the author because there is no difficulty in doing so as long as one has suitable formers with iron cores.

## THE CIRCUIT

A switch allows the connection of the aerial on the cascade pre-amplifier and connects the two 6AK5s (triode connected) to the following superhet. This pre-amplifier is used only if very weak signals on 28, 21 or 14 Mc. have to be received. There is about one S-unit gain in signal to noise ratio with the amplifier on, which is a help in difficult cases. The r.f. gain of the following superhet. can be reduced to prevent cross modulation if strong local stations are near the receiving frequency. If there is heavy QSB the a.v.c. can be adjusted to have control on the two r.f. stages with or without the pre-amplifier connected. These adjustments can be carried out with a 10,000 ohm cathode resistor and a 1 megohm a.v.c. control grid resistor.

One small neutralising coil was found to be satisfactory on all three bands

between the two pre-amplifier valves, preventing oscillation and to give good gain.

The five sets of coils of the two pre-amplifiers, the two r.f. stages, and the mixer grid tuned circuits are identical with taps at each coil to provide a transformation of the valve input impedance, to reduce oscillation tendency, and to get the desired band spread for each band. Valve electrodes and the sections of the variable capacitors are on the same taps of the coils.

The tracking of the oscillator was calculated with the slide rule using a method which may be published later in "A.R." The alignment of the tuned circuits can be done with a calibrated grid dip meter. The 1 Mc. crystal frequency marker gives strong harmonics even on 28 and 29 Mc., due to the crystal diode working as non-linear harmonic forming device.

The 150 volt regulator controls the plate voltage of the first two oscillators and that of the "S" meter valve and the mixer screen grid voltage. The standby switch has connections to take the B plus off the pre-amplifier and the two r.f. stages when the transmitter is working. This allows me to listen to my own transmission and to see how much of the frequency spectrum my modulation band is covering.

The first i.f. is near 5.3 Mc. and a shielded link line goes to the i.f. chassis from the mixer valve (similar to an EF50 with separate grid No. 3). One valve on the first i.f. is used to separate the two mixer stages and the seven tuned circuits which form a 10 Kc. wide bandfilter with very steep flanks, thus preventing strong signals, which may be twice the second i.f. away from the incoming frequency or first i.f. after mixing, getting through. If these points are overlooked the double conversion superhet. may have more images than a single conversion superhet. Tests with a signal generator have shown that only one frequency is getting through.

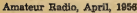
The receiver is free from cross modulation if the signals received are not stronger than 3 millivolt or 30 db. over S9 on the 14 Mc. phone band. With an additional cathode resistor the i.f. gain of the first i.f. and second i.f. amplifier can be set to such a value that the mixer noise can just be detected with different settings of the second i.f. selectivity control. This is an important point not often achieved with Amateur receivers.

The tuning of the second oscillator can be adjusted to bring the megacycle marks of the receiver dial always on the dot when checking with the calibrator. It is wrong to use crystal control here because the second oscillator is much more stable than the first oscillator, unless crystals are used as in the Collins 75A receiver.

It is not necessary to repeat here the description of the double crystal filter because all details are given in the April and May, 1954, "A.R." The bandwidth of the flat top of the response curve

\* 25 Berrille Road, Beverly Hills, N.S.W.





can be continuously varied from 0.5 to 3.5 Kc., which allows the desirable reception of the carrier and one sideband of the phone transmission. The carrier has to be tuned to one side of the i.f. pass band. At 60 db. down the bandwidth is 7 Kc., which is equal to the Collins mechanical filter. One side of the response curve is steeper and the other one is not as steep, as the curve of the Collins filter. A four-gang 7 to 14 pF. capacitor is used for bandwidth control. The single side c.w. reception is very good. S.b. reception is also possible without difficulty (switch a.v.c. off, use full a.f. gain, regulate r.f. gain, switch b.f.o. on and adjust carefully to one side of the i.f. passband).

There is a special "S" meter valve. The calibration of the "S" meter is such that 100 microvolts from a signal generator parallel to 70 ohms gives half scale meter reading and is called S9. The step for each "S" unit is 6 db., which is a voltage ratio of 1:2.

The b.f.o. frequency is adjustable. This is more flexible in s.a.b. or c.w. work than the crystal control first used.

A 6H6 has the usual function, rectifying the i.f. voltage to get a.v.c. and a.f. voltage. There are three valves of low gain together with nine tuned circuits and two series crystals in the second i.f. amplifier working on 352 Kc. All coils are of the iron dust shell type permeability tuned and wound by the author. Here again only ceramic capacitors, which have a very low power factor of better than 0.04%, have been used. A sketch (shown above the first crystal filter stage) shows the turn

percentage ratio for the taps on the i.f. coils of the double crystal filter.

The noise limiter is quite effective, reducing the circuit noise without affecting the audio gain. It is a series diode circuit with automatic adjustment of the level, depending on the modulation percentage (valve is a 8004).

The top chassis accommodates the two stages of audio amplification, the power supply and the loudspeaker. The output valve can be switched off if head-phone reception only is desired. The a.f. output valve is capable of delivering 4 watts of audio at 10% distortion. A second speaker can be connected. There is also a tone and a.f. volume control.

#### PERFORMANCE

With the used carrier plus one selected sideband receiving method, one can hear DX signals without trouble when other local stations were complaining about QRM. With this receiver the internal receiver noise is always less than the noise picked up by the aerial when no signal or static is present. I could always hear the DX stations other local Amateurs copied with similar strength, the only difference is due to various aerials used.

Due to the small capacity of the variable air capacitors of 6 to 18 pF. a very high L/C ratio had to be used, which is much more difficult to stabilise than others with 50 to 100 pF. in the oscillator circuit. But still the warm-up drift is only a few kilocycles, which can be compensated with the second oscillator and the drift changes in direction after 30 minutes of operation.

The "S" meter is calibrated for an r.f. and i.f. gain which reads S1 on receiver noise when the antenna is switched off.

An a.f. output of a monitor may be connected to the a.f. amplifier. The audio response of the a.f. amplifier is so adjusted that low frequencies are attenuated to give the right ratio of low and high a.f. response because the highest a.f. tone allowed to go through depends on the i.f. bandwidth or on the way of tuning in the station.

This receiver was built with no more facilities than the average Amateur has. The only difficulty may be in obtaining the turret. (One should be available soon. Watch for advertisement in "A.R."—Editor).

#### VALVE DETAILS

The valves used are in some cases German Telefunken types, which can be easily substituted by those locally available.

Type EF14 is similar to the 6AC7 (7 Ma./V. gm., but 5 watt).

Type ARP35 is similar to the EF50 (g3 must be separate).

Type 4671 is a Philips acorn triode.

Type RV12P2000 is a miniature valve with 2 Ma.V. gm.

Type RV12P2001 is similar, but with variable gm for a.v.c. operation.

Type RL12P10 has 9 Ma./V. gm, but is similar to a 6V6.

The RV12P2000 can be used with a.v.c. if g2 has a high resistor.

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## SIMPLE AMATEUR MICROWAVE EQUIPMENT FOR TERACYCLE FREQUENCIES\*

Whilst studying the derivation of the cavity resonator from the simple parallel tuned circuit (A.R.R.L. Handbook, 1953 Edition, page 425) the writer was struck with the possibility of a different development of the parallel tuned circuit, and considered theoretically what might be done with it.

In the ordinary tuned circuit there is both lumped capacitance C, and the distributed capacitance of the coil L. If the coil be made small enough the distributed capacitance, though itself small, may be such in relation to the inductance of the coil that the L/C ratio of the coil approaches optimum for a tank circuit for extremely high (teracycle) frequencies.

Now consider the application of direct current to such an inductor. Almost instantaneously, a counter E.M.F. is developed, which opposes the flow of the applied current. If the coil has some resistance, a sufficiently small in-

ductance, and the correct L/C ratio, such that the time interval between the application of the direct current and the development of the back E.M.F. is of the order of the time of a half-cycle at the resonant frequency of the coil, electromagnetic oscillations will be set up and will continue while the original current is applied. C.w. transmissions can be achieved merely by keying the applied d.c.

Experimental work with such an arrangement led to ultimate success, although it was found necessary to mount the coil in an inert atmosphere (or in vacuo).

A simple parabolic reflector was found to give a good beaming effect.

No experiments with modulation have yet been conducted by the writer.

With two such transmitters, and using simple receiving apparatus which followed conventional practice for such frequencies, two-way Amateur communication has been established over more than one mile.

Communication is, however, restricted to line-of-sight.

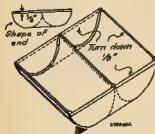
\*Specially contributed to this number of "A.R." by a VK6 Amateur, whose name has become detached from the ms. during transit.

## HINTS AND KINKS

### HOLDER FOR NAILS, NUTS, BOLTS, ETC.

**XYL** Spare that jam tin! The OM will make a handy holder from it while he reads his neighbour's mail.

Use a patent opener to remove both ends of a jam tin or a fruit tin. Draw a line directly opposite the folded seam to mark the position of the new fold. Now cut along one side of the seam, smooth the thick side with a file, and turn down about one-eighth of an inch along the other side. Fold the halves outwards at the marked line and, standing the whole thing vertically on another piece of tinplate, mark a boat-shaped outline, leaving an extra one-eighth inch along the top, for turning outwards. Using this as a template, make a duplicate for the other side.



Now solder up the job as shown. This is more easily done if you "back" the two ends and the pointed middle section first. For tin-plate, resin-cored solder is ideal, and finally, a coat of enamel will prevent rust.

Several of these units could be joined together side by side to make a sectioned tray, their round shape proving a decided advantage when picking up small nuts or quarter watt resistors.—VK4MA.

### V.H.F. BY-PASS CAPACITORS

Do not throw away Atlas 30-40 watt fluorescent light starters. Open them up and remove the 0.006  $\mu$ F. disc mica condensers. These are ideal for v.h.f. by-pass capacitors.—VK5ZAD.

### FOOT SWITCH

For that "break-in" foot switch on your transmitter use a dip-switch from the automobile to operate the change-over relays. Since it is a double acting single pole double throw, it is a cinch.—VK5LL.

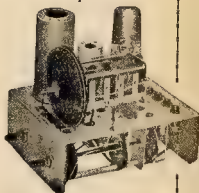
### RELAY RECTIFIER

If you are looking for a rectifier for your relay supply use that 83 mercury vapour tube that you have discarded from the h.t. supply. The voltage drop is about 15 volts across the tube, so make allowances in the transformer winding. A 16  $\mu$ F. electrolytic used for smoothing will also provide an initial high current surge to close the relay. The 83 will pass an ampere at the low voltages used without blushing.—VK5XU.

### FIXING BRAM WIRE ELEMENTS

For fixing the wire elements into beam supports drill oversize holes and pour in molten sulphur and let it harden. Sulphur melts a few degrees above the boiling point of water (at 114°C.) into a straw-coloured liquid. It has very good insulating properties.—VK5XU.

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# VOLTS, AMPS. AND MAN

## MAN'S CONTACT WITH HIS ELECTRICAL ENVIRONMENT

### PART ONE

BY ROBERT H. BLACK,\* M.D.

In this article an attempt has been made to sketch the various ways in which man may come into contact with electricity in his environment.

IN the first place, early man was much impressed by lightning and fear of this phenomenon is still widespread in modern times. Although lightning has now been explained in physical, in place of supernatural, terms its targets appear to be chosen in a somewhat promiscuous fashion. The accompanying thunder does much to heighten the fear and uncertainty of those who are affected by this natural phenomenon: the victim of the lightning stroke cannot find much comfort in the explanation that the stepped leader came near to the earth in his vicinity. Again in nature, the electric fish and rays are interesting curiosities rather than a serious threat to human life.

The deliberate application of electric currents to man are exemplified by judicial execution in this way and by its use to treat mental illness. These two uses have provided some information for the understanding of the phenomena which occur when man accidentally comes into contact with industrial supplies of electricity.

It is surprising that the number of deaths from accidental contact with industrial supplies has not increased in step with the increased use of electricity in the home and factory. Much of the credit for this is due to the awareness of the problem on the part of manufacturers of electrical equipment. But the number of deaths is not inconsiderable and there is much room for improvement of preventive measures, such as the use of low voltages for electric hand tools and early education and supervision to prevent those deaths due to carelessness, ignorance and overconfidence.

### MAN'S CONTACT WITH ELECTRICITY IN NATURE

#### Lightning

Man's first contact with electricity in nature was probably his experience with lightning. Some of the oldest records of this contact were found in the ruined cities of the Tigris and Euphrates dating back to 3,000 or 4,000 years B.C. and in these the destructive nature of lightning is portrayed.

In many parts of the world lightning has been attributed to a supernatural origin. The ancient Greeks regarded it as an activity of Zeus who, however, would sometimes lend a thunderbolt to a member of his family—as when Pallas Athene borrowed some of her father's lightning to transfix Ajax. The Romans considered that death from

lightning was a punishment from Jupiter and the victims were buried without their just funeral rites.

In ancient Egypt the god Seth hurled the thunderbolt; in Norse legends it was the god Thor. Early statues of Buddha show him carrying a thunderbolt with prongs at each end. David the psalmist called upon Jehovah to use his lightning to scatter and destroy the enemy.

In France there was a superstition that people who had been struck by lightning and recovered had for 40 days the power of curing all kinds of diseases by touching the body of the afflicted person. It is also recorded that during this period they touched his pocket as well.

Amongst the Bantu tribes of South Africa the belief is held that lightning is produced by a magic thunder-bird, Umpundulu, which dives from the clouds to earth and whose vivid plumage and beating wings give rise to the flash and thunder. Damaged trees are the evidence of its claw marks.

In Europe and England it was for many centuries the general practice from the time of Charlemagne to supplement prayers for protection against lightning by the vigorous ringing of church bells to ward off the demons of the air. The bells were consecrated for this purpose—among others. Whenever a thunderstorm threatened, the bell-ringers were called to the church to ring peals. Before they were equipped with lightning conductors churches were, of course, frequently struck by lightning and the mortality amongst bell-ringers was high. It was reported in 1874 that in 35 years lightning had struck 386 church towers and killed 163 bell-ringers at the ropes.

With the development of artillery in the 18th century there arose the need to store large quantities of gunpowder in vaults and magazines. The vaults and crypts of churches had long been used for the storage of weapons and food and, naturally, were used to store gunpowder. Their tall steeples and explosive content made churches very dangerous places in thunderstorms, and a number of disasters occurred. In 1789 one hundred tons of gunpowder in the vaults of the church of St. Nazaire, in Brescia, were exploded by a lightning flash. The resulting explosion destroyed one-sixth of the city and killed 3,000 people.

Lightning also struck wooden ships at sea and in 1798 the "Resistance," of 44 guns, was blown up by a lightning flash.

In modern times some apprehension may be felt by passengers in aircraft flying through a thunderstorm; however, all evidence goes to show that the extent of the material damage from a lightning stroke to aircraft made entirely of metal is not usually serious if the metal is well bonded together. Nevertheless, an all-metal aircraft may be placed in difficulties by the effect of

the flash on its navigating instruments. The radio communication and direction finding equipment is readily put out of action by the discharge unless it has been well earthed to the main frame of the plane. It is also not unusual for the magnetic compass to become unreliable, either through the direct action of the discharge on its magnet or through magnetisation produced by the heavy current passing through or near steel in the aircraft. At night the brilliance of the flash may temporarily blind the pilot, generally only for a few seconds but sometimes for several minutes. Since the air is very turbulent, there is a risk that the aircraft may be in danger during the period of the pilot's disability and the automatic pilot should be ready for engagement in these circumstances.

The infant colony of New South Wales met with early misfortune when several sheep, brought by the first fleet, were killed by lightning while sheltering under a tree during a storm. The first residents in the colony were very much impressed by the large number of thunderstorms. In Australia during the five years 1948-1950 lightning killed 19 males and 2 females, and, in the last few years, we have seen cricket again deteriorate into a blood sport when several players have been struck by lightning in the field as a change from a sharply rising ball on the log stump.

Many more people are struck by lightning than are killed. On one occasion a church was struck with 300 people in it; 100 were injured and mostly made unconscious, 30 had to take to their beds, but only six were killed.

With lightning stroke the victim usually falls unconscious at once. If he recovers he often suffers from loss of memory for recent events so that he may not remember any impact or, indeed, anything of what has happened. Thus Pliny said that "the man who sees the lightning flash and hears the thunder, is not the one to be struck." Sometimes, however, memory of the blow is retained and the recovered victim may speak of a flash of light or colour, a feeling of a rush of wind, or a blow in the back. Whichever is the case, he frequently discovers a loss of power and sensation in the lower half of the body; he is unable to walk or stand. This effect is only temporary and passes off within about 12 hours.

Lightning often deals violently with its victims and the result may resemble that of an attack by thugs. The clothes may be completely torn off and the boots ripped, bones may be broken and burns inflicted. Metal articles of the person become magnetised and may cause impressions of their outlines to be formed on the skin. A forked or arborescent pattern often appears on the skin.

Nothing was known, or even guessed at, as to the true nature of lightning until 1708 when Wall called attention

\* VK3QZ, 2 Yerton Ave., Hunter's Hill, N.S.W.

to the similarity between it and the sparks drawn from rubbed amber. In 1754 d'Alibard and also Franklin drew sparks from aloft during thunderstorms. In this way it was proved that a flash of lightning was merely a particularly large and powerful electric spark, and nothing so romantic as a bolt from Jupiter or Thor.

The nature of lightning has prevented the making of experimental observations of its effects on animals. In the middle of the 18th century some experiments were made with the electric discharges brought down from the heavens during thunderstorms, using kites and lightning conductors. But experimentation of this kind came to an abrupt end when, in 1783, Professor Richmann, of St. Petersburg, was killed in his laboratory by a lightning stroke a foot in length which he had brought into his room by a lightning rod mounted on the roof of his house.

Franklin's work resulted in the use of lightning-rods for the protection of buildings. The first of these was installed in Philadelphia in 1753 and in the following year they were installed widespread throughout America; their use spread slowly to England and to the continent in the following decade. Franklin's work having been received with scepticism by the Royal Society, there was by no means a universal adoption of his method of protection against lightning.

Modern investigation of lightning received a great stimulus with the development of the Boys' lightning camera, invented by Sir Charles Boys in 1902. By a system of rotating lenses equivalents of exposures in the order of micro-seconds were made possible. Investigations have also been made by using free and captive balloons, aircraft, radar and ground instruments and observing the effects on electrical transmission systems. The mechanism of the lightning flash has been largely elucidated but the method of generation of the charge is not fully explained.

Some quantities may be mentioned to give an idea of the power involved in the lightning stroke which occasionally includes man in its path. The potential difference between the base of the thundercloud and earth just before a flash occurs lies between a hundred and a thousand million volts. The most frequent value for the quantity of electricity discharged in a complete flash is 20 coulombs. Values as high as 180 coulombs have been observed. (A coulomb is the amount of electricity which flows when a current of one ampere flows for one second.) The most frequent peak value for the current in the return stroke (usually from earth to the cloud) is 30,000 amperes, but values as high as 200,000 amperes have been observed. The average value of energy spent in a flash to ground is 5,000 million calories; a cloud giving one flash per every 20 seconds is dissipating electrical energy in the form of lightning at an average rate of a million continuous kilowatts. One flash vaporised the cable of a captive balloon.

This energy is mainly spent in heating up the six inch wide channel of air along which the flash passes. In a few ten millionths of a second the air temperature rises to about 15,000°C. The air in the channel expands explosively, creating very powerful sound waves.

The length of the flash varies from about one half to two miles or more.

These quantities make it somewhat doubtful if a direct hit with a lightning stroke is compatible with human survival. The subject who has been described as surviving a stroke, lying bewildered on the ground wondering how his pants and boots were torn off, may have been the victim merely of a near miss.

Indoors in a properly protected building there is little lightning hazard to man if he avoids the telephone and water taps, and earths the radio aerial during a thunderstorm. The most dangerous places out of doors are small sheds, isolated trees, wire fences and hill tops; the safest ones are depressions in the ground, deep valleys, the foot of steep cliffs or a grove of trees.

### The Electric Eel

Man also encounters electrical shock in nature from a number of electric fish and rays. The most powerful of these is the electric eel of South America. Although resembling an eel in shape, this fish belongs to an order which includes the carp and catfish. In size it attains a length of three feet and the thickness of a man's thigh. It is a sluggish fish given to lying still in shallow water, rising to the surface from time to time for a gulp of air; it will drown if denied access to air for more than fifteen minutes. The electric organ of this fish develops a shock powerful enough to stun the largest animal.

The fish are eaten by the Indians and Humboldt described their method of fishing for these dangerous creatures. Horses were first driven into the pools to exhaust the fishes' electric power—a process which nowadays might be frowned upon by the A.J.C. if not by the R.S.P.C.A. You can imagine a jockey galloping down the straight whipping the favourite with a nice specimen of *Electrophorus electricus* (the Electric Eel).

In 1841 a live specimen was seen in London by Schonbein. It had lived there for more than a year. When the end hands of a chain of people holding hands were placed in the water containing the fish they all received a heavy shock which made them leap into the air. A spark could also be drawn, indicating the nature of the shock.

Faraday made observations on the electric eel, but it was not until comparatively recent times that accurate measurements were made on the voltages and the power output developed. Peak voltages as high as 650 have been recorded, although 400 volts was about the average reading for specimens 80 cms. in length, at which size they generated their maximum voltage. Eels 11 cms. long, however, only generated 60 volts. The voltages were measured with the fish out of water using an oscilloscope. The discharge occurs in pulses and the whole electric organ does not discharge simultaneously. The power output out of water was determined by measuring the voltage developed across a resistance: the maximum external power was found to be about 40 watts; it may be somewhat higher. An exhausted eel may have its voltage reduced by as much as one-third and will not discharge as frequently as a fresh one. Even exhausted eels are

handled carefully with thick rubber gloves in the laboratory.

The electric generator of these fish is made up of a large number of units. If the organ acts like a set of batteries in series, it is calculated that each of these units produces 100 millivolts per cell or an electromotive force of 10 volts per centimetre of electric organ.

The structure of the electric organ represents modified muscle tissue. The average electrical power which it can continue to deliver over any considerable length of times does not appear to be greater than the mechanical power developed in a muscle of the same size. The speed with which the peak power is obtained is doubtless much greater in electric than in muscle tissue.

### THE DELIBERATE APPLICATION OF ELECTRICITY TO THE HUMAN BODY

No electrical apparatus capable of producing currents strong enough to kill animals was invented before about the middle of the 18th century.

Priestley in 1787 killed kittens and dogs with the discharges from condensers and tried, without success, to resuscitate a kitten by artificial respiration, distending the lungs by blowing with a quill into the wind pipe.

In 1775 Abildgaard killed cocks and hens by passing the discharge from a Leyden jar through their heads. He resuscitated fowls, which would otherwise have died, by discharging a second Leyden jar through their bodies. One such cock, resuscitated by this counter shock, recovered with such rapidity that it flew away scattering apparatus and Leyden jars in its flight.

Brodie, 1828, spoke of restoring to life guinea pigs apparently killed by electric discharges by means of perseveringly infusing their lungs by bellows.

Richardson used a large induction coil, in 1869, which gave sparks up to 29 inches in length, but these could produce no fatal effects unless reinforced by the use of Leyden jars.

Many experimenters have tried, unsuccessfully to electrocute frogs. The frog survives electric shocks and the prolonged passage of 10, 100, 1000 volts and more. On the other hand the dog can be killed by an alternating current of 15 volts or 80 milliamps applied so as to pass largely through the heart muscle for a few seconds only.

It is quite apparent that the results of animal experiments cannot be applied directly to man. Nevertheless, having regard to some of its remarkable manifestations it is not surprising that electricity became to be regarded as a "vital" force and it has been used on numerous occasions in an attempt to cure many of the ailments of man. A great deal of charlatanism has been associated with this use of electricity, as in the case of electric belts in connection with which the public was informed that electricity is life; any beneficial effect from these belts was due to faith and warmth. More reputable uses of electricity in the treatment of disease have been in the stimulation of nerves to secure muscle contraction, and indirectly as electromagnets, x-rays and diathermy.

More recently, electricity has been used very extensively in the treatment of mental diseases; but, before this sub-

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ject is examined, the use of electric currents for the deliberate killing of man deserves some attention, even if it merely serves to emphasise the fact that electric currents can be lethal.

#### Judicial Electrocution

Electrocution is a portmanteau word coined in the United States of America in 1892 to describe execution by electricity. This form of judicial execution was introduced with the intention of making death more instantaneous and more merciful than hanging on the gallows. It first became lawful in the State of New York in 1888 after 19 animals, including bulls, horses, calves and dogs had been killed in the presence of an Advisory Commission appointed by that State. One William Kemmler was selected as the first criminal to be executed by this means and, after the validity of the law had been upheld in the State and Federal courts, he was executed in 1890.

The introduction of this method of execution resulted in a great deal of controversy, both in America and the United Kingdom. Electrocution was held to be a cruel and unusual punishment violating the constitution. It was frequently stated that the shocks merely stunned the criminal who then suffered death at the hands of the doctor performing the post mortem examination which the law required to be carried out immediately after the execution. Thomas Edison was amongst those who considered that this method of execution was no more humane than hanging. This controversy lasted for 20 years or more, but the method was adopted by other States in America and is in use at the present time.

There may have been no doubt about the effect of the first fall of the guillotine blade, but there was probably some experimentation required before the technique of hanging was perfected.

Certainly with electrocution the early executions were of an experimental nature although four which were reported from Sing Sing prison at New York in 1891 were described as being a "triumphant success."

It was one thing to kill a horse or a bull or a calf with electricity and another to ensure that a human had been painlessly and effectively brought to the end of his days. Various suggestions had been made about the voltages and currents to be used, and the methods and sites of application to the body of the criminal. There was some difficulty in killing the first criminal, Kemmler, but even three years later, difficulty was still being experienced in obtaining the desired result. On July 27, 1893, W. G. Taylor was placed in the electric chair and 1280 volts were applied for 52 seconds. Taylor was apparently dead for the next 20 seconds; then he gasped. An attempt to turn the current on again failed; the victim's circulation and breathing recovered and he began to move. He was taken from the chair, given a large dose of morphia (three quarters of a grain), and then chloroform and ether were administered. When anaesthetised he was returned to the chair and the further application of 1280 volts for 40 seconds proved to be effective on this occasion.

Eventually the execution machine came to consist of an alternating dynamo capable of developing 2,000 volts, a "death chair" with an adjustable head rest, binding straps and adjustable electrodes. The criminal to be executed was firmly strapped into the chair and electrodes were secured to his head and the calf of one leg. The voltage, current, time of application, and number of applications were subject to variation, but in one reported case 7 amperes were passed at 1500 volts for a total of 70 seconds. This is a somewhat large quantity of electricity and it is esti-

mated to be sufficient to raise the temperature of a 10 stone man by 5°F., apart from the heat generated by muscle contraction. Indeed, the temperature of the bodies executed in this fashion often rises to near 130°F. within 20 minutes and there is in many cases coagulation of the muscle protein: the "hot seat" has apparently been truly named.

#### Electroconvulsive Therapy

In 1935 von Meduna reported his attempts to treat one of the mental disorders (Schizophrenia) with artificially induced epileptic convulsions. His reasons for using this method were, firstly, epilepsy and this mental disorder were usually antagonistic to each other, and secondly, the symptoms of the mental disease disappeared at least temporarily after spontaneous convulsions. Drugs were first of all used to cause the convulsions but more recently these have been replaced by the use of electrically induced convulsions. Electro-convulsive treatment is now widely used for other mental disorders. It may be stated here that the mode of action of this treatment is apparently as little understood as is the cause of the mental disorders themselves.

The machine used to induce these convulsions consists of a source of current alternating at 50-60 cycles with means for measuring and regulating it, together with a time switch calibrated in tenths of seconds. The electrodes, well moistened with saline, are applied to either side of the head using electrode jelly to reduce the resistance.

The effects produced depend upon the applied voltage and, naturally, the current flowing between the electrodes. Potential differences below 50 volts applied for one tenth of a second may not lead to unconsciousness, but rather cause violent giddiness and nausea. The application of between 50 and 70 volts for one tenth of a second leads to unconsciousness without producing convulsions. By increasing the voltage the stage of unconsciousness is followed by a convulsion. If the voltage is increased still further the period of initial unconsciousness is progressively shortened and finally becomes unmeasurable.

It is usually possible to produce a convulsion with a voltage of between 70 and 130 applied for from 0.1 to 0.5 second. By using a surge current recorder the actual amount of current passing during this treatment was found to range between 200 and 1600 Ma.

When this treatment was being developed preliminary measurements of resistance were made with a 1 milliamper current passing through the head. The readings ranged from 200 ohms to several thousand ohms, varying with the patient and in the same patient on different days. This measurement has since been discarded as it gave no useful indication of the current which would subsequently produce a convulsion.

Naturally, a preliminary examination is made to ensure that the subject is physically fit for this form of treatment and there have been but few fatal casualties—the death rate being about 6 per 10,000 treatments in a series collected in the United States of America.

(Concluded next month)

## TUNE INTO HIGH FIDELITY!

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SEND for quotation on the Mullard Amplifier with A. & R. output transformer.

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## 6252 (QQE03/20) DOUBLE TETRODE

The 6252 (QQE03/20) is an indirectly heated r.f. double tetrode for use as Class C amplifier at frequencies up to 600 Mc.

### GENERAL DATA

Cathode: Indirect, oxide coated.

Heater sections in

Parallel Series

Heater voltage .. 6.3 12.6 V.

Heater current .. 1.3 0.65 A.

Capacitances:

per system in push-pull

Ca 2.0 pF. Co 1.3 pF.

Cgl 6.5 pF. Cl 4.0 pF.

Amplification Factor (each unit):

Grid No. 2 to grid No. 1, 8.5.

Mutual Conductance (each unit):

At anode current of 40 Ma., 2.4 Ma./V.

Mounting Position: Arbitrary.

Cooling: Temperature of seals, 180°C. max. Generally natural cooling is sufficient with:—

Va = 600 V. up to 150 Mc.

Va = 400 V. up to 250 Mc.

Va = 300 V. up to 400 Mc.

Above these limits or with high ambient temperatures, it may be necessary to direct an air flow of about 15 cu. ft. per min. on top of the bulb to keep the seal temperature within the stated limit.

Size:

Overall length 79 mm. max.

Seated length 70 mm. max.

Diameter 47 mm. max.

Base: Septar.

Socket: 40202.

Pin 1—heater.

Pin 2—control grid of unit No. 1.

Pin 3—screen grid (both units).

Pin 4—cathode and beam plates.

Pin 6—heater mid-tap.

Pin 7—control grid of unit No. 2.

Pin 5—heater.

### H.F. CLASS C TELEGRAPHY

Operating Conditions (two units in p.p.)

Frequency 200 200 200 200 Mc.

Anode voltage 600 400 300 200 V.

Screen voltage 250 250 250 200 V.

Cont. grid bias -50 -50 -40 -30 V.

Anode current 50\* 50\* 50\* 50\*Ma.

Screen current 4 4 4.5 4 Ma.

Control grid current 0.7\* 0.3\* 0.3\* 1\*Ma.

Anode input 80\* 20\* 16\* 10\*W.

Anode dissipation 9\* 7\* 5.5\* 4\*W.

Screen dissipation 1.6\* 1.0\* 1.1\* 0.8\*W.

Driving power 1.5\* 1.15\* 0.75\* 0.5\*W.

Output power 42 28 19 12 W.

Efficiency 70 65 63 60 %

\* Per Section.

Frequency 400 400 400 600 Mc.

Anode voltage 400 300 200 300 V.

Screen voltage 250 250 200 250 V.

Cont. grid bias -50 -40 -30 -40 V.

Anode current 50\* 50\* 50\* 50\*Ma.

Screen current 3.0 3.0 3.3 2.8 Ma.

Control grid current 1.0\* 1.0\* 1.2\* 0.8\*Ma.

Anode input 20\* 15\* 10\* 15\*W.

Anode dissipation 8\* 7\* 5\* 9\*W.

Screen dissipation 0.75\* 0.75\* 0.86\* 0.7\*W.

Driving power 2\* 1.5\* 1\* 1\* W.

Output power 22 16 10 12 W.

Efficiency 55 53 50 40 %

\* Per Section.

### H.F. CLASS C FREQUENCY TRIPLER

Operating Conditions (two units in p.p.)

Frequency 66.7/200 133/400 Mc.

Anode voltage 300 300 V.

Screen grid voltage 250 250 V.

Control grid bias -180 -180 V.

Anode current 2 x 4.5 2 x 4.5 Ma.

Screen grid current 2.5\* 2.8 Ma.

Cont. grid current 2 x 1.0 2 x 1.2 Ma.

Anode input pow. 2 x 13.5 2 x 13.5 W.

Anode dissipation 2 x 9.5 2 x 10 W.

Screen grid dissipation 2 x 0.63 2 x 0.7 W.

Driving power 2 x 1 2 x 2 W.

Output power 8.0 7.0 W.

Efficiency 42 35 %

## 5894 (QQE06/40) DOUBLE TETRODE

The 5894 (QQE06/40) is an indirectly heated double tetrode for use as an h.f. amplifier, oscillator, frequency multiplier and modulator.

### GENERAL DATA

Cathode: oxide coated, filament indirect.

Heater sections in

Parallel Series

Heater voltage .. 6.3 12.6 V.

Heater current .. 1.8 0.9 A.

Capacitances:

Ca = 3.2 pF. Co = 2.1 pF.

Cgl = 10.5 pF. Cl = 6.7 pF.

Cgl1 = 0.08 pF.

Amplification Factor (each unit):

Grid No. 2 to grid No. 1, 8.2.

Mutual Conductance (each unit):

At anode current of 30 Ma., 4.5 Ma./V.

Mounting Position: Vertical with base up or down, horizontal with anode pins in one horizontal plane.

Cooling: Radiation. When the tube is used at frequencies above 150 Mc. it may be necessary to direct a low velocity air flow on the bulb and the anode seals. Temperature of bulb and anode seals, 200°C. max.

Size:

Overall length 105 ± 4.5 mm.

Seated length 100 mm. max.

Diameter 49 mm. max.

Base: Septar.

Socket: 40202.

Pin 1—heater.

Pin 2—control grid unit No. 1.

Pin 3—screen grid (both units).

Pin 4—cathode and beam plates.

Pin 5—heater mid-tap.

Pin 6—control grid unit No. 2.

Pin 7—heater.

### H.F. CLASS C TELEGRAPHY

Operating Conditions (two units in p.p.)

Frequency 200 250 430 500 Mc.

Anode voltage 600 600 520 500 V.

Screen voltage 250 250 250 250 V.

Cont. grid bias -80 -80 -80 V.

Grid resistor 20 K.

Anode current 100\* 100\* 100\* 100\*Ma.

Cont. grid cur. 2.5\* 2.5\* 2.8\* 3\*Ma.

Screen current 16 16 18 20 Ma.

Peak grid-to-grid driving volt. 200 V.

Screen dissipation 4 4 4.5 5 W.

Anode input 60\* 60\* 52\* 50\*W.

Anode dissipation 15\* 17.5\* 19\* 20\*W.

Output power 90 85 66 60 W.

Efficiency 75 71 64 80 %

\* Per Section.

### H.F. CLASS C ANODE AND SCREEN GRID MODULATION

Operating Conditions (two units in p.p.)

Frequency 200 200 400 Mc.

Anode voltage 500 300 300 V.

Screen grid volt. 250 250 250 V.

Control grid bias -55/-40/-40/-V.

bias -100 -60 -80 V.

Anode current 40\* 40\* 40\*Ma.

Screen grid current 4 4 3 Ma.

Cont. grid current 0.5\* 0.5\* 1.0\*Ma.

Anode input power 20\* 12\* 12\*W.

Anode dissipation 6.5\* 4.5\* 5.5\*W.

Screen grid dissipation 1\* 1\* 0.75\*W.

Driving power 2.5\* 1.25\* W.

Output power 27 15 13 W.

Efficiency 67.5 62.5 54 %

\* Per Section.

### H.F. CLASS C ANODE AND SCREEN GRID MODULATION

Operating Conditions (two units in p.p.)

Frequency 200 Mc.

Anode voltage 450 V.

Screen grid voltage 250 V.

Control grid bias -100 V.

Anode current 2 x 7.5 Ma.

Screen grid current 16 Ma.

Control grid current 2 x 2.5 Ma.

Peak grid-to-grid driving voltage 120 V.

Anode input power 2 x 34 W.

Anode dissipation 2 x 9 W.

Output power 50 W.

Efficiency 73 %

### L.F. CLASS B AMPLIFIER AND MODULATOR WITHOUT GRID CURRENT

Operating Conditions

Anode voltage 600 450 300 V.

Screen grid volt. 250 250 250 V.

Cont. grid bias -27.5 -27.5 -26 V.

Load, plate/plate 12.5 10 8.5 K.

Peak grid/grid driving voltage 55 55 52 V.

Anode current 62\* 58\* 56\*Ma.

Screen grid current 23 27 30 Ma.

Screen grid dissipation 5.8 6.7 7.5 W.

Anode input power 37\* 26\* 16.8\*W.

Anode dissipation 12\* 8.5\* 5.6\*W.

Output power 50 35 22.5 W.

Total distortion 2.4 3.1 2.9 %

Efficiency 67.5 67.5 67 %

\* Per Section.

### L.F. CLASS B AMPLIFIER AND MODULATOR WITH GRID CURRENT

Operating Conditions

Anode voltage 600 450 300 V.

Screen grid volt. 250 250 250 V.

Control grid bias -25 -25 -25 V.

Load, plate/plate 8.0 6.0 4.0 K.

Peak grid/grid driving voltage 78 78 75 V.

Anode current 100\* 97\* 94\*Ma.

Screen current 28 28 30.5 Ma.

Control grid cur. 2.6\* 2.6\* 2.6\*Ma.

Driving power 0.1\* 0.1\* 0.1\*W.

Screen grid dissipation 6.5 7.9 7.6 W.

Anode input power 60\* 43.5\* 28.2\*W.

Anode dissipation 17\* 13.5\* 9.7\*W.

Output power 86 60 37 W.

Total distortion 5 5 5 %

Efficiency 71.5 69 65.5 %

\* Per Section.

## Helvetia 22-Contest

Once again the well known Helvetia 22-Contest is coming up. The Swiss Union of Shortwave Amateurs has scheduled its annual contest for the following date: 1500 G.M.T., 12th May, to 1500 G.M.T., 13th May, 1956.

The Swiss Society will combine all efforts to give this year's contest a successful progress and invites all Amateurs to take part.

**Object:** Stations outside Switzerland will try to work as many Amateur Stations in each of the 22 Swiss Cantons as possible.

All Amateur bands between 3.5 and 29.7 Mc. may be used for c.w.—c.w. or voice-to-voice contacts. The serial exchange consists of the usual five-digit (phone) or six-digit (c.w.) numeral, representing the signal report and the number of the contact (RST001, RST-002, etc.). Entrants will use the call "CQ HB" or "CQ H22".

**Scoring:** Three points are earned for a contact with any Swiss station on each band. The total points earned on all bands are multiplied by the sum of all worked Swiss-Cantons on c.w., voice or both together, on all bands. The maximum multiplier possible, per band, is 44 (22 on c.w. and 22 on phone).

**Entries** will only be accepted if submitted on separate sheets for each band, using only one side of the paper, and with the declaration: "I certify that my station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the decisions of the Council of the U.S.K.A. will be final in all cases of dispute." (Signature).

**Reporting:** Reports must be mailed not later than 31st May, 1956, to—U.S.K.A., Box 1203, St. Gallen (Switzerland).

## HOSPITALITY OFFERED

Upon returning to Malaya from leave, Jim Pershouse, VS2DQ, found the Australian Army all around. He will be very glad to offer hospitality, particularly to any who are Amateurs or sons of Amateurs in VK. Perhaps if required, personal contacts could be arranged. He will also help any of the Forces there who would like to apply for an Amateur licence in Malaya. If wishing to visit, etc., please write to J. C. Pershouse, VS2DQ, Baling Estate, Kuala Ketil, Kedah, Malaya.

## AMATEUR CALL SIGNS

FOR MONTH OF JANUARY, 1956

### NEW CALL SIGNS

**VE—**  
**NEW SOUTH WALES**  
**2ZBQ—**N. R. Fenton, 508 Cabramatta Rd., Cabramatta.  
**2ZCJ—**J. V. Smith, Farm 237, Griffith.  
**2ZCL—**L. T. McLoughlin, Hunters Valley, Elderslie, via Scone.  
**2ZCT—**K. A. Thomson, 38 Alton Rd., Coorambong.

### Victoria

**3ZCH—**J. M. Howden, 21 Green St., Burwood.  
**3ZCO—**C. J. Waterlander, William St., Ouyen.  
**2ZCP—**A. D. Pringle, Station "Gretna Green" Nepean Highway, McCrear, Postal: C/o Telephone Exchange, Dromana.  
**2ZCT—**D. R. Town, Flat 4, 1235 Hoddle St., East Melbourne.  
**3ZDY—**D. C. G. Johns, Johanson's Rd., South Warrandyte.

### Queensland

**2ZAG—**J. C. E. D'Alton, M/a. 1583, Redcliffe.

### South Australia

**2ZAY—**G. P. Velland, 19 Lynton St., Tumbar.

**2ZBE—**R. B. Connor, 60 Matthew's Ave., Seaton.

### Western Australia

**2ZAN—**T. H. Talbot, "Wedderburn," Brunswick Junction.

**7AR—**A. Doodson, 33 Campbell St., Launceston.

### CHANGES OF ADDRESS

#### New South Wales

**9GM—**G. McDowell, Lot 2, Campbell Hill Rd., Chesley Hill.

**2AAD—**R. Hodgins, Donald St., Nelson Bay.

**2ABT—**B. Ash, Dalgero St., Coonabarabran.

**2AGM—**W. C. Berry, 3 Irvine Place, Lismore.

**2ALJ—**N. O. Beard, 4 De Chair Rd., Dee Why.

**2ASQ—**A. K. Simpson, Box 6, Cremorne.

**2ATA—**P. A. Savaris, 25 Millford St., Randwick.

**2EAS—**S. D. Russell, Lot 14, Dumbier Ave., Lurnea, via Liverpool.

### Victoria

**3AC—**R. Cameron, 54 Hawthorn Gr., Hawthorn.

**3AKY—**K. W. Young, 179 Ormond Rd., Elwood.

**3ALN—**A. S. W. Taylor, C/o L. R. Schultz, 6 Victoria St., Nhiji.

**3CY—**C. Yeoman, 136 Haldane St., Beaumaris.

**3EW—**E. C. Wheller, 21 Coghlan St., Kellar East.

### Queensland

**5AF—**A. S. Little, Ashbourne Rd., Strathalbyn.

**5CT—**C. F. Hewitt, 29 Stanley Ave., Blair Athol.

### Western Australia

**6AY—**A. V. Tredder, 178 Coods St., South Perth.

**6CX—**H. T. Simmons, 163 Bateman Rd., Mt. ...

### Tasmania

**7JP—**L. J. Durkin, Council St., Queenstown.

Postal: C/o P.O., Queenstown.

### Territories

**1GA—**G. L. Apple, Mawson, Antarctica.

### CANCELLED CALL SIGNS

**VK—**  
**Western Australia**  
**6AR—**A. Doodson. Now VE2AR.

### Tasmania

**7ZAT—**K. A. Thomson. Now VK2CT.

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# SHORT WAVE LISTENERS' SECTION\*

## VICTORIAN FEBRUARY MEETING

This meeting of the Group was held at the rooms on 28th. The first part of the meeting was spent planning details of meetings and activities to be held by the Group in the future. During the course of the meeting, it was proposed that a committee be formed to undertake the organisation of lectures and events, such as visits to places of interest. A motion was put and carried to this effect, and Dave Rankin and Ian Hunt were duly elected in this capacity. Gerry Lane was also chosen to assist in the running of the committee. It was felt that the committee would be useful in taking a burden from the shoulders of the general committee of the Group and leave them more time for administrative duties.

A new member was welcomed to the meeting, namely Lola Burton, who is definitely very keen on short wave listening. Lola, as usual, had a really good log of stations for us. Noel ZZO was present, busily sorting QSL cards.

A very interesting programme has been prepared for the Group, including lectures from various illustrious personages and visits to places of interest. The visits to be arranged include an inspection of the City West Telephone Exchange, DDA, and various Amateur Stations. Further details of these visits will be broadcast over VK3WI and advised at the Group meetings. So come along one and all and find out what it is all about.

The second portion of the meeting was occupied by a demonstration of a s.o.s. with a built-in audio etc., constructed by one of the younger members of the Group. He brought it along without being asked, and we might say now that we don't mind anyone bringing in any equipment they think may be of interest to others. It proved all round to be quite an interesting item and some of the patterns formed looked really pretty.

At the March meeting, Max 32S gave a talk on the organisation of the Wireless Institute of Australia. I have heard a rumour that Max may be capable of writing an article on this subject. (Editor please note.)

\* Compiled by: Ian J. Hunt, WLA-13007, 101 Robert Street, Northcote, Vic.

At the April meeting (on 24th), Hans 3AHH will give a talk on Amateur Radio overseas. Hans has first hand knowledge of this subject, and this meeting should be a must for anyone at all interested in radio. All Amateurs are welcome to attend.

The May meeting of the Group is a free night. You may come along just for a rag-chew, bring in some kind of equipment you have, show off all the QSLs you have received or bring in your log and work on it. If some Amateur would like to arrive at the meeting with a car full of portable gear, or anything at all, he may. We won't lock any of you out you know 28th May is the date.

Congratulations are due to our very enthusiastic member, Gerry Lane, who recently broke the distance record for a QSO on 228 Mc. It is understood that his record has since been broken by others, so congrats to all of you. Michael Ide is understood to be moving to a new QTU soon—still in the metropolitan area.

John Wilson was welcomed back to the last meeting. First time we've seen him since the festive season, and he's looking very fit too. Len Poynter seems to have as much energy as ever. Ian Hunt is now the proud possessor of an ABR300 and expects to really hear things. That 8 meter seems to fascinate him and he swears that all reports will be genuine from now on. We don't seem to hear much from the country chaps, so what about letting us know about some of your escapades.

## ANY AMATEUR NEEDING ASSISTANCE?

The Short Wave Listeners' Group would be pleased to hear from any Amateurs who think we may be able to help them in such forms as monitoring transmissions and checking for h.c.l., etc. If you are perhaps going mobile and would like reports on transmissions, just let us know the approx. time and frequency and we'll do our best to be a help to you.

You may also be able to help us, too. If you have any suggestions you think would be of interest, or could come along and give a lecture or demonstration at any of our meetings, please let us know. We would also like to hear from any of you who would be willing to receive a visit of a small number, say six,

of s.w.l.s. to see your home station. Any ideas along these lines may be forwarded to John Wilson, 37 Raymont St., Alphington, or Ian Hunt, 101 Robert St., Northcote. Ian Hunt may also be contacted by telephone, MY 250, Kst. 528, during the day.

## STATIONS HEARD ON THE BANDS

33 Mc.: VK3 3AHH, 3ATN, 5MS.

7 Mc.: W8XT, VK2 2, 4, 5, and 7.

14 Mc.: F8HRT, ACSPN, FOLAN, CTIER, KHSARG, ZK1RL, VE1EL, SMESA, EATEN, CIECO, VRAAG, KWSZA, KHENES, PARCC, N7VMD/KGH, KGSNO, KANCL, VKBAS, VK SDB, VKRBS, VVICZ, GATF, KRCSO, DULCY, HZ1AB, HPBDA, KARFC, VSEW, RGEAAY, KCGUZ, KAKKS, VK1LJ, FUEAC, ZK1RS, VBERV, VRCSZ, VYAB, KHRK, VYVVK, ZK3PV, KXABU, FKACF, VRB, VEDICT, 48TVR, KPAUSD, KP4WD, OEFJ, ZSSS, W8FWG/KWE, JASAV, HEZKN, VICEZ, VITAL, EDW, EA-RBB, HPICC, GMLQ, GMSHD, CESPV, KRRT, ZAKCQ, KAJWW, VSEBO, W1, 2, 3, 4, 5, 6, 7, 8, 9, 6, VK1, 2, 3, 4, 5 & 7, 8.

21 Mc.: ZLAKH, VK3AKZ, FKACF, VKJZF, ZL1QA, KSRBH, ZL1JE.

## VICTORIAN DIVISION W.I.A.

★

## ALL-BAND SCRAMBLE

The next event will be held on

2nd APRIL (Easter Monday)

★

Let's make this the best Scramble ever!

★

Rules: page 12, Sept. '55 "A.R."

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PV14-55

# FEDERAL, QSL, and DIVISIONAL NOTES

## FEDERAL

### FEDERAL COUNCILLORS

Federal Executive has been advised that Mr. J. Coulter has been appointed Federal Councillor for the next twelve months from March, 1956. This means that Jack VK4JD is continuing in the position which he has held with such success during the past year. It is most pleasing to see members willing to place their knowledge and experience at the disposal of the Institute.

It is also noted that Mr. R. Hugo, VK6KW, has been asked to leave the position of Federal Councillor in the Western Australian Division. Ren's experience will stand him in good stead as well as will his work for the coming year.

Federal Executive expresses its appreciation of the fine work of Mr. G. Moss, VK6GM, who has carried out the duties of Federal Councillor so conscientiously during the past years.

### PACKING OF QSL CARDS

It has been brought to the notice of Federal Executive that due to faulty packing some Amateurs, both here and overseas, have unfortunately lost some, or all, of the cards they have sent through the mail. It is suggested that where a number of handlings can be expected, members make certain that the cards are packed in such a manner as to avoid the parcel breaking and allowing the cards to be lost.

### W.A.C. ON R.R.B.

Interest in a.s.b. continues to grow and the celebration of the 1st A.R.S. for December indicates that a certificate is now available. The following excerpt supplies details:

"To stimulate experimentation with single-band techniques throughout the world, the Headquarters commenced the issuance of W.A.C. Certificates endorsed for a.s.b., where the cards submitted show clearly that both the candidate and the stations he worked were using such equipment. Member societies are encouraged to make applications as being for a.s.b. if there is sufficient evidence on the cards to lead to them. To date, ten of these certificates have been issued."

## FEDERAL QSL BUREAU

### RAY JONES, VK8RI, MANAGER

WIRTH and his VL are holidaying on the French Riviera at Martinique, in the Indian Sea. He is operating on approx. 14,800 Kc c.w. and also on phone. He is signing F5TNT and well informed W circles predict that St. Martin will be classified as a new country.

A new certificate promulgated as from 1st January, 1956, is that of W.A.S.P.—Worked All Sicilian Provinces. It is available to licensed Amateurs anywhere in the world. The rules provide that the award will be granted to Amateurs who can prove by confirmations that they have worked, by radio or otherwise, at least 1st July, 1955, with at least five Sicilian Provinces in any band, phone or c.w., or a combination of both. The Sicilian Provinces are: Agrigento, Catania, Caltanissetta, Enna, Messina, Palermo, Ragusa, Siracusa and Trapani. Claims for the award, together with the necessary evidence, should be sent to I.T.I.T.A.I., Box 330, Palermo, Sicily.

The R.E.F. is staging a contest during March and April. Unfortunately details were forwarded by post late and did not arrive in time for advance publication. The phone section was scheduled from 1200 GMT March 3 to 2400 GMT March 4. The c.w. section is to be held on April 14 to 15 with same hours as the phone section. The group to be exchanged consists of the RST plus a running serial number of the confirmations, e.g. 57001, etc. It is to be sent to the R.E.F., Box 42-01, Paris R.P., France. Logs are usable for claims for the D.P.F. or D.P.D.

In an interesting letter to Austine, VK5VL, Kidong Kang, who operated HLAA/Poribale during December, 1955, gives details of the expedition for which the station was used. The station was using 15-30 watts and was temporarily licensed for the Mt. Chili climbing party of the Seoul Engineering College. The stations were contacted and them being the following VKs: SHW, 320, 45K, 4YP, 4SL, 3MS, 2MT, 6AF, SATN 5VW, 3AHL and 4VY. Kang had received QSLs from SHW, SATN, 3MS, 4VY and he promises to send his card when the annual exams end approx. end of January. His QTH is Kidong Kang, 62-16, 3-KA, Pilsong, Seoul, Korea.

Avio, who is signing W.L.F/M/M from aboard the ship "S. S. 'Zaliska'" on the voyage from America to Japan, uses 130 watts to a long wave. Tx is a Viking and the Rx is a 3X7. He requests outstanding VK QSL cards to be sent to him at "The Poplars," St. Mary's Road, Mortimer, Berks, England.

Further information from Dave Lingo, VK7HL, reveals that he has and been very active due to commercial station work. Dave was due to leave for Tahiti in March for a holiday and while there, he hopes to get on the air as an F0B. He says that a QSL card has been sent to all VK stations worked, but if required, another card will be sent.

Requests for outstanding QSL cards for ex-DLAFS, 3A2AB, LX4FS, KZ5ND and W89RB should be made to Guy Kane, 1158 Clarendon St., West Sacramento, Calif., U.S.A., who now, as K8AQP, has one of the outstanding W signals on 14 Mc. c.w. band.

Ray Baily, ex-VK8A and VR1D, after having washed up at Fanning Island, has proceeded to the U.S.A. Ray visited W4GD in Tennessee, end of Feb., and continued on to many other States. His itinerary provides a period in England and Italy and he expects to arrive back in Australia end of June.

## FEDERAL AWARDS

### W.A.V.E.C.A. AWARD

During the last month a certificate was issued to SM7QY, Gunnar Ekstrom, Gullbergs, Sweden. G. Weynol, VK3XU, Awards Manager.

## NEW SOUTH WALES

### WITH SERVICE ONLY

For the past few months we seem to have been too late in getting our notes in "A.R." Let's hope we have not got this time. Don 2RS is very active on 141 Mc., running sids with the VK8 boys. Don has new 616 p.s. and 24 Mc. beam. He is from Griffith, a new area, but John Smith has new Z call sign; congrats John. Hear we have a new call at Culkarn.

A meeting was held at Griffith on 11th March to arrange this year's Convention at Griffith. News of what took place next month.

Alan 2SJ has moved into the zone at Pinley; welcome to the zone. Alan 3QD and 3EU (Albury) heard occasionally ragchewing. The Tumut gang have been quiet lately, have heard 1PN on 60 mX occasionally. The chaps at Wagga seem to be very busy, maybe the fact of the hot weather here we are having. What about a signal and some news chaps? Well that is all for the time. I have at the moment, hope for more next month.—JAJO.

## VICTORIA

The Victorian Division is most fortunate in having obtained the services of Mr. Fred Bell, 3YE, as Honorary Secretary of this Division. Fred's eagerness to do a job and get it done and his extreme thoroughness, is well known to all who know him personally and the Division.

## VK2 DIVISION W.I.A.

### EMERGENCY NET FREQUENCIES

7050 and 3575 Kc.

Please listen before using 7050 Kc. as this frequency is very much in use by VK2WI these days.

Thanks, VK2WI.

tion should benefit greatly from his services. Already he has been busy arranging the programme for the general meetings for the coming year, which comprises a series of lectures about to appear to be very interesting to all.

### April 4—Annual General Meeting.

May 3.—A lecture by Mr. Wally Hunter, of Zephyr Products, on Microphone Manufacturing Technique.

June 4.—Mr. Campbell, of Masse Batteries, will lecture on the manufacture and care of storage batteries.

July 4.—Mr. Jack Vertigan, 3WR, will lecture on Single Side Band Technique.

There will be two general meetings in August, one on the 8th and a later one on the 29th, this later one will take the place of the September meeting as there will be no general meeting in that month. For the August meetings arrangements are in hand for a lecture by Mr. Alan Foxcroft on Propagation, and for the other meeting a Frigman Lecture. When complete details have been finalized for these two lectures, they will be advertised in "A.R." The Annual State Convention is scheduled for 29th November.

At the March general meeting the following were welcomed as new members of the Institute: 3AHL, 1. Harding, 3AHL; P. Playstead, 3APF, as full members, and Messrs. R. Lockerbie and F. Featherstone as associates.

The feature of the evening was Mr. Kempson, of the Melbourne Technical College Staff, and he lectured on the new TV operators' commercial licence. He also dealt with automation and the enormous field in that direction that is opening up for the young men of today and tomorrow. Mr. Syd Clark, 3AHL, presented a paper on the voluntary weekly donation by members to the building fund and suggested a weekly amount of 1/6. This matter was discussed at length and the members offered a bit to think about. It was reported that during the Olympics in Melbourne the W.I.A. will send an Olympic team and the grandstand has been left in the capable hands of Max 32B. Log Books are still available at the rooms at 4/6 per copy.

3AHL is at present spending a six months' holiday in New Zealand and is endeavouring to make the personal acquaintance as many ZLs as he can during his tour of ZL land. Ron 3AIIJ, who has recently returned from a mobile tour to VK8, is now working the gear for 3AHL, and is at present buying a three element beam for that band.

### VICTORIAN ALL-BAND SCRAMBLE

#### February, 1956, Results

Another Victorian Scramble was held on 6th February, 1956. The winner in Section C was again 2AIIY with 16 points, all earned on 144 Mc. Section D was won by WIA-1391S, 36 points.

Section C: 2AIIY 16, 32AQ 14, 32BE 13, 3YS 12, 3XB 11, 3OJ 7, 3ABA 6.

Section D: WIA-1391S 12.

Check logs received from 3HE and 3AHE, who also did the checking.

As mentioned in last month's notes, the next Victorian Scramble will be held on 2nd April (Easter Monday). Let's make this the best scramble ever! Rules of this Bi-Monthly Victorian Scramble can be found in the "A.R." Sept. '55. Send your log to the Divisional Contest Manager, W.I.A. Vic. Div. 191 Queen St., Melbourne, C.I.—7J AHE.

### CENTRAL WESTERN ZONE

During the past couple of months activity in this zone has been very limited as far as your scribe is concerned, and I think also, most members seem to be less active during the summer months. This is due, perhaps, to the country members having more work to do harvesting, etc., and the city dwellers spending longer daylight hours tidying up the gardens, so getting onto the best side of the XYL. However, I guess, as the summer now wears on, more midnight oil burned when the longer nights restrict our outside activities. Chas 3IB is at present on holidays, which he is spending in Tasmania, so I guess he will come back with glowing reports of the Apple Isle. Harold 3AX is busy building a new V.L.O., expect he will be catching that one DX in the near future.

### NORTH EASTERN ZONE

Our Secretary, Ernie Scanes, is working on his 8C35B, VK3AX, XYL. He has been enjoying a caravan holiday. Ken 2AQQ





Barbier SMD, Bowen SXU, Brice SOK, Busenschutt 50R, Bulling SXK, Judd SHQ, Parsons EPS, and Vivian S7D were the successful candidates for office. The President's report has already been published so no details of that. The Treasurer's report was well received and Mr. Sullivan, S7K, proposed that the usual honoraria be presented to the Secretary and Treasurer for their sterling work.

During "smoke" and completely off the record, an "on-air" remark concerning the number of "B's" appearing on the list of councillors was overheard! Personally, being one, I should say that this is a record—any takers?

A discussion on the merits and short-comings of the Christmas Social took place and the general consensus of opinion seemed to be that the present set-up is satisfactory, with some changes in entertainment, perhaps. The 50-54 M's, 50-52 M's, change brought forth much partnership, but eventually satisfactory expansion came forth and VK5WI still transmits a signal on the 50 Mc. band each Sunday morning for those who wish to find the band!

The retiring President was honoured with life membership in the Institute as a token of the members' appreciation for the work which had been done.

After the distribution of QSL cards the business of the ordinary general meeting was dealt with. One new Associate, Grime McKellar, was accepted into membership and a resignation from Ralph Taylor received with regret. Very few matters other than routine ones were dealt with and the large body of enthusiasts who had remained throughout set to for a good old "pow-wow."

At the Council meeting held at Goodwood on 4th Feb., the newly elected members chose Mr. John Bulling, SXK, as their Chairman and President of the Institute for the new term of office. John is electrical maintenance engineer at Osborn (E.T.E.A.) and has had plenty of experience to back him as President of the Institute and we all wish him well in the highest office. Jack S1D and Brian SCA fill the offices of Vice-Presidents, with Harvey SHQ your new controller, accepting the office of membership organiser. The other officers remain as for 1955-M. Following the decision to increase Council to eleven members, at the Annual General Meeting, another member will be co-opted to bring Council to full strength.

The Hobbies Exhibition is now in full swing at the Adelaide Town Hall and VK5WI is represented with a display of v.h.f. h.f. equipment loaned and installed by Messrs. Austin, Beasley, Sopelster and Bowen. These latter, together with Arch SXX, Rob S8G, Associate John Campbell, are doing duty as operators and chief publicity agents. Next year, April, 1957, an exhibition will be at Wayville for six weeks and the Institute is going to need all hands on deck, so keep the date in mind please.

Jack S1D is again on the high seas (and the higher the better for he left me 12 hours to get these notes written!), I have to glean where he has reappeared (or cast where he has fished perhaps would be better) to gather personalities. The T.v.i. Technical Committee met on 21st Feb. and decided on a course of action which includes a series of three lectures at the general meetings. Its members are Ray SBT (Chairman), Rob S8G (Secretary) and Scribble, Ian S2AA, Phil S2AD, Des SDK, Clem SGL, and Gordon SXU. By the time this is printed another meeting will have been held at Phil's place on 20th March.

40 mc hasn't been too healthy lately and there is much feverish activity on 30 mc as the sunspots stir up the ionosphere. At the rate that things are going, this peak will go beyond 1954 and beyond August next year. Those interested in assisting with the Geophysical work sponsored by Australia should give their names to the Hon. Secretary as soon as possible.

SCJ has been busy on the shack and should be settled in before the winter; he no excuse then, Col. Claude SCH has been busy trying to keep up the supply to keep the rest of the gang on the air. These blackouts are no good when you're chasing some rare DX. Claude, better have Stuart QRT next time the load gets near the danger point and everything will return to normal. SWS has been getting results with his converter on 2 mc with his beam perched up some 70 ft., heard quite a few VKs and several VKs; can wait till he get the tx on Stuart and can work them.

Leo S2AG reports that his 2 mc converter is performing well; better host your beam up a bit Leo and let Bram know you are about. Bram S4B is getting stuck into some DX on the lower frequencies, believe he has started an antennae farm up there at Hynam with vee beams several wavelengths long. S7D still finds no time to throw his switch on. Tom S7W and

John SJA still not active. John is probably too busy while Tom is saving up for the next 2000 Contest. S3K is a little more active lately, especially on 40 mc phone working Carl S5S—recent new call on the band.


## TASMANIA

As press dead-line will not permit coverage of the meeting to be held in the club rooms on 7th March, the most I can say thereon is that TGA's lecture on the Hydro Electric Commission's activities should be most appropriate, in view of the fact that the Annual General Meeting and Dinner are to be held at Bronte. As you read this, the Dinner will of course be a thing of the past, but I feel sure that it will still be a memorable event, in keeping with the efforts put into it by Reg TFW and his aides.

At a recent Council meeting, Doug TAB was demonstrating the virtues of a well known make of v.f.o. It proved reluctant to give any output at all, mainly because of a switch so recently installed that it was overlooked, but boy, oh boy, when that switch was found, and operated, there was certainly oodles of drive. A burned out meter left Doug darned sorry that he ever found the switch.

TWI now operates on the full 100 watts due to the efforts of Joe TB3, who at the present time is on recreation leave. Judging by the number of reports coming back on 40 mc on Sunday, I would say the results certainly justified the efforts, and if results on 80 mc were similarly rewarding, then a long felt want has certainly been satisfied for council members.

I hear that Ted T7J has recently taken unto himself a pair of 807s, and since Ted is only a short distance, airline, from me, it looks somewhat as if I am for it at last. Ah well, it was good while it lasted. I definitely saw Max TML poring over the coil switching circuit of a proposed tx. In striking a cautious note, I shall only comment to the effect that it certainly augurs well for the future, and the bug may yet get in a gear in the near place. Associate Johnny Grace seems to be overcoming the various difficulties associated with the construction of sounder vacuum tube reduction equipment, and the finished product is very nearly ready for presentation. Seems to me that there is good material there for a lecture and demonstration—what say ohnny?



# A & R

## OUTPUT TRANSFORMERS

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### ULTRA LINEAR OUTPUT TYPES

**★ TYPE 921 (921-8: 2 or 8 ohms; 921-15: 3.7 or 15 ohms):**

**For VALVES:**

807, KT60, etc.

**Suitable Conversion**

"WILLIAMSON" to U.L.

See "Audio Engineering" of June, 1955.

**30 WATTS: 30-30,000 o.p.s.**

**Primary: 6,000 ohms.**

**SCREEN TAPS: 10% of Plate Z.**

**F.R.: Plus or minus 1 4h 10-60,000 o.p.s.**

**Leakage Inductance:**

1/2P/10P: 18 mH. maximum.

Prim/Sec: 20 mH. maximum.

**★ TYPE 931 (931-8: 2 or 8 ohms; 931-15: 3.7 or 15 ohms):**

**For VALVES:**

618, EL87, KT60, etc.

See "Audio and Hobbies" of February, 1955, 17 watts U.L. Amplifier.

**30 WATTS: 30-30,000 o.p.s.**

**Primary: 4,500 ohms.**

**SCREEN TAPS: 10% of Plate Z.**

**F.R.: Plus or minus 1 4h 10-60,000 o.p.s.**

**Leakage Inductance:**

1/2P/10P: 15 mH. Maximum.

Prim/Sec: 15 mH. maximum.

**★ Ultra Linear Output Type—**

Type 916—18 watts.

Prim.: 6,000 ohms p.p. (with screen taps).

Sec.: 916-8: 2 or 8 ohms;

916-15: 3.7 ohms.

Type 949—12 watts.

Prim.: 6,000 ohms p.p.

Sec.: 8 & 12.5 15 ohms.

Response: 10-30,000 o.p.s.

Valves: 6Y8, 6BW8, KT61, EL84, etc.

10% Screen Taps.

**★ For Mullard "5-10" Amplifier**

Type 8205—12 watts.

Prim.: 6,000 ohms c.t.

Sec.: As below.

Response: 10-30,000 o.p.s.

Type 2505—8

Type 2545—15

For 3.7 or 15 ohms Secondary.

**STONEY — N.S.W.:**

United Radio Distributors P/L, 123 Phillip St.

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Ted YEL has sprouted out on his own in business at Devonport, and we wish you success. Ted is a very capable fellow who concentrates too heavily on the receiving side. Associate Vance Tobrman is exploring new meters and is now allied with a reasonably well known power generating organization. Do not forget that ticket Vance when you happen to ponder on frequencies over 50. Alan TOL has moved in to have a go at the receiving side. make up his mind on rhombics, ve beams and the like. Good work. "AL" however pick on something that will hang in there and stay down south. An. ATS/ARS combination now graces Bert's (TBC) set up and I understand that he has more or less forsaken the v.h.f.s. for the time being. George BELL, I thought by now that you would be the 2 mhz king on that part of the coast.

Con. To my forecast, Len TILS has not yet unpacked the gear at Wynyard. I must have words with Nostradamus on the subject—something wrong somewhere when my prophecy is so much astray. Len TLE recently took part in a short three act play. Curtain rises on one to show Len in the shack, entranced by the music made by some invisible force using his antenna set-up for a double-bass. Act two features Len bravely venturing forth to find a horse and a wind machine. A half-yard speeding with the halyard. Act three shows the escape of the intruder, and the rapid descent of an antenna, suspended in a halyard speeding upwards. Curtain falls on Len, gazing at point to feet high, in an attitude of supplication, with words on his lips that none can hear—just all our guests.

Well chaps, before the fader is finally closed on me, I would like to wish the new scribbles good luck with his ham and his friends. To those who have been such a great help with news items at various times. Cheers all, TJD.

#### NORTHERN ZONE

The election of office-bearers for the forthcoming year is as follows: President: G. Kinnear, TGM; Vice-President: R. Kilby, TRK; Secretary: H. Solomon, V.H.F.; Treasurer: TFF; QSL Officer: C. Wright, TLX; Zone Correspondent: W. Briggs, TLX.

Constitutional Officer: Woodruff who, at long last, received his limited call, TZAW, and is at once very active on 2 mhz, both with and without the proper radio system. Ken FREDERICKSON, H. Solomon, V.H.F., has been our constitution officer for some time. Our constitution also to Henry Solomon, who just failed to pass the theory section of the examination, but don't give up Henry, re-examine again.

After a very successful opening to the 2 mhz season, Gordon and Peter, TGM and TFF respectively, commenced a campaign from front ends to include the latest in low-noise triodes BCWT (BC68), and both promise good results. Len TBQ and Col. G. and Co. are again here involved in the possibilities of 3 over 100 for 2 mhz and appear to like them, as all three have them in operation, so DXK on 3 mhz for the time being, assumed.

Believe Bill TDB is putting the candle beneath the 1 Mc. rig and will shortly be heard on phone. Max TCA is trailing some queer noises on 2 mhz; any leads Max? As also are many super-regen. rx's on the way. Tx hunts are being held while the good weather lasts. Ken FREDERICKSON, the 2 Mhz mobile installation going fine fashion now and is looking forward to many contacts during May this year, when he will be visiting the three Eastern States—TLX.

#### NORTH WESTERN ZONE

The monthly meeting of the North Western Branch was held on the 15th of April at Overstone. There was a good attendance of members from Devonport and Burnie. Four new members were present. The meeting was a R.D. Contest scoring was discussed and it was agreed that more information on past contests should be published to enable a new system to be worked out.

In the Burnie municipality the Town Planning Commissioners have adopted new regulations and Amateur Radio Stations will be treated as a semi-commercial business. It seems they require someone to explain to them exactly what a radio station is. Recently Mr. Moffat requested W.I.A. Hobart to arrange interview and impress on the Town Planning that Amateur Radio is a hobby.

A very neat portable transceiver, built by TJO, was the centre of attraction for quite a number of the members. After the meeting was an excellent supper was provided by TDR's XYL.

all look forward to hearing from him and what it is like to be leading a life of ease with a well equipped and efficient service. Several DXers from the big smoke, including RH, who showed up on 40 mhz phone several Sundays ago, and look forward to hearing you often. Len TOL at 9AU is back with us again, and quickly got back into form by knocking over the DXK in his usual brilliant manner, contributing his share of QSLs to DXCC minded individuals. SDB also heard in the recent W contest and turning on the heat in the delight of the W. He also played a very interesting role. Len TOL stand has a very interesting lecture coming up, which had to be postponed due to a.c. power failure. Most of the time, Len TOL will be on Sundays and get the good old right from "Double Brandy's" bottle.

EEB still fitting around the country in a fancy car, but occasionally finds time to drop in for a rag chew. Has quite a wealth of gear spread around broadsheet fashion, but slowly being confined to a rack and panel. SRM still chasing DXCC and was and has been recently informed that he is the recipient of the third ADJ award. FZZ very QRL with a big Hydro scheme and at present pondering just how to fume his water race around the side of a 1,500 ft. cliff, but always finds time to drop in for a rag chew. Len TOL is now at 9AS trying to coax a few extra erps out of his 40 and 80 mhz rig with considerable success.

SCW is still a Radio Club member, and getting on 20 mhz just as soon as some of the junior lads become more familiar with Amateur Radio. He is also planning to be the first to have an overseas QSO on c.w. It is quite surprising just how quickly these lads catch on and we are fortunate in having the local commercial operator to our assistance and apparently getting quite a kick out of seeing the way they progress.

So far, we have no poles, and the activities of the Rabaul boys, and would like to hear of the doings in that neck of the woods, as occasionally some trouble on short skip on 20 mhz, but not long enough for a solid QSO. Don't forget gals to send in anything of interest up to West for coverage in these notes in order to keep the coverage as complete as possible.

## CORRESPONDENCE

The opinions expressed in these letters are the individual opinions of the writers and do not necessarily coincide with those of the publishers.

#### INCREASED POWER ON 144 Mc. AND ABOVE

Editor "A.R." Dear Sir, I believe that Federal Executive has from time to time raised with the 144 Mc. the question of power limits for the Ham bands. The answer, is that for bands below 50 Mc. no good purpose would be served by an increase in the legal limit.

However, anyone familiar with the work of WUK, W4HUK, W1HDK and others using 1 kw. inputs on 144 Mc. high gain beams, etc., will be aware of the considerable contribution Amateur Radio has made to our scientific knowledge in the past couple of years.

The 144 Mc. band is a transmission of 2 mhz signals over distances of 1,000 miles by the meteor scatter method.

This, however, is not the only contribution Amateur Radio can make to our knowledge. Power on transmission by topspheric scattering, correlation of the meteor scatter with weather, ionospheric transmission along ducts and so on, can be carried out by the Amateur.

However, it has been demonstrated that for most of this work, power of several hundred watts are necessary. I feel there is a good argument for increase in the legal limit to, say, 500 watts on 144 Mc. I am quite prepared to go into this matter at greater length if sufficient interest is in evidence.

—I. F. BERWICK, VK3ALZ.

[Federal Executive is always pleased to receive technical data supporting such claims through the member's Divisional Council.—Ed.]

#### IMPROVING 55-60 Mc. BAND

Editor "A.R." Dear Sir,

The W.A. Division of the W.I.A. has notified members of the intention to help Professor R. C. Webster, of the Queensland University during the International Geophysical Year of 1957-58 with reception of the radio signals from the "Aurora Polar" and, we hope, from any other anomalous propagation.

This appeals to me as an excellent scheme and if the results of Amateur communication out of the ordinary can be co-related to Aurora, Met. Sporadic E and goodness knows what else, then work on 55-60 Mc. will be well worth while.

There are a few things that could be done on the band to improve activity and results. Firstly, an increase in power input to the final to 230 watts if required would be a distinct advantage or in any case sufficient increase to enable some of the excellent v.h.f. tubes to be run to capacity.

Secondly, an extensive use of pulse. This would require long time intervals to enable to be conducted while waiting for something to break and the use of c.w. monitoring for back scatter and the possibility of forward scatter. The pulse could be used for those with sufficient enterprise.

Thirdly, and I consider this to be the most important, open up 55-60 Mc. of the W.I.A. Licensees and let the Z boys have a go at it. It is definitely a phone band and when the DX break-through occurs c.w. seldom works. Since the Z boys have shown (they have in VK5 anyway) that they can really build gear, get excellent results on 144 and 55 Mc., their addition to the small number active on 55-60 Mc. should do an awful lot of good, and in view of Prof. Webster's appeal, I don't see how we can do otherwise.

So Mr. Editor, if you can bring this to the notice of the Federal Council, perhaps they will do something about it. I am sure that Australia and in so doing, hand out a little compensation after giving up 55-60 Mc. to TV without saying boo.

—ROGER CHOATE, VK8KX.

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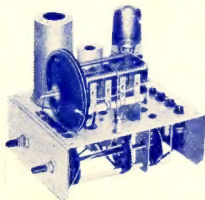
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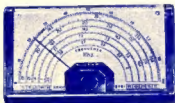
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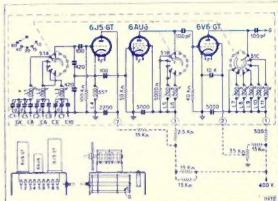


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